



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/517,417	03/02/2000	Olivier Isson	S1022/8316	4387

7590 10/28/2004
James H Morris
Wolf Greenfield & Sacks PC
600 Atlantic Avenue
Boston, MA 02210

EXAMINER

ODLAND, DAVID E

ART UNIT	PAPER NUMBER
----------	--------------

2662

DATE MAILED: 10/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/517,417

Applicant(s)

ISSON ET AL.

Examiner

David Odland

Art Unit

2662

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 July 2004.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6,9-17 and 20-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6,9-17 and 20-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Claim Objections

1. Claim 6 is objected to because of the following informalities:

The claim limitations written in lines 7-9 are the same as those written in lines 10-12, thus they appear to be redundant limitations. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-5 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

Claim 1 recites "...the processing circuit operating in the time domain only..." in line 9. This limitation of the claim was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 2-5 are rejected because they depend on claim 1.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Art Unit: 2662

4. Claims 1-6,9-17 and 20-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 also recites "...subtracting from a signal received on the subscriber line an estimated echo obtained using a filter from a signal portion following the end of the current outgoing symbol and a beginning portion of the current outgoing symbol." in lines 10-12. This limitation is confusing; it is unclear what is being subtracted.

Claims 2-5 are also rejected because they depend on rejected claims. Claims 6 and 17 recite "...essentially replacing the first portion of the echoed signal..." It is unclear what is meant by "essentially replacing" (i.e. is the first portion actually replaced or not).

Claims 9-16 and 20-27 are rejected because they depend on rejected claims.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1,4,6,11,12,14,15,17,22 and 23, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho et al. (USPN 5,317,596), hereafter referred to as Ho, in view of the Admitted Prior Art (APA) described in the present specification on page 3 lines 1-18, hereafter referred to as APA.

Referring to claim 1, Ho discloses a digital subscriber line transmission system (a data transmission system (see figure 4)) comprising an inverse fast Fourier transform circuit generating successive outgoing time domain symbols on a subscriber line from respective groups of digital frequency domain coefficients (a N point IFFT circuit (see item 102 of figure 4)); a fast Fourier transform circuit generating groups of digital frequency domain coefficients from respective incoming time domain symbols received on the subscriber line (an N point FFT circuit for incoming symbols (see item 104 in figure 4)), a current incoming symbol being delayed with respect to a current outgoing symbol by a predetermined time interval (incoming symbols are echoed and thus delayed from the outgoing symbols (see figure 4 and column 6 and 7)); and means for subtracting from a signal received on the subscriber line an estimated echo obtained using a filter from a signal portion following the end of the current outgoing symbol (a time domain echo is subtracted from the incoming block (see item 104 of figure 4)), and a beginning portion of the current outgoing symbol (a frequency echo portion related to the outgoing signal is added to the incoming block to eliminate echo (see item 104 of figure 4)), wherein said portions have a duration at least equal to said predetermined time interval (the incoming blocks are echoes and thus are delayed (see figures 3 and 4 and columns 5 and 6)).

Ho does not disclose a circuit for making a local echo orthogonal. However, the APA discloses a prior art method wherein circuitry is used to make echo signals orthogonal (see page 3 lines 1-18). It would have been obvious to one skilled in the art at the time of the invention to implement this aspect of the APA into Ho because as the APA points out if echo signals are not orthogonal the discontinuities which have a wide spectrum will occur and affect all the nearby channels.

Referring to claim 4, Ho discloses the system discussed above. Furthermore, Ho discloses a FIFO memory receiving the outgoing symbols (a block delay circuit for storing outgoing symbols (see item 130 of figure 4)); a subtractor arranged for subtracting the outgoing symbols from the output of the FIFO memory (a adder/subtractor for subtracting the outgoing symbol from the output of the delay block circuit (see item 140 in figure 4)); said filter receiving the output of the subtractor and enabled only during said predetermined time interval from the end of each outgoing symbol (the Tail Cancellation circuit receives the output of the subtractor and filters the Tail (or end) of the outgoing symbol (see item 150 of figure 4)); and an adder receiving the output of the filter and said incoming symbols (an adder receives the output of the Tail Cancellation circuit and the incoming symbols (see the adder in item 104 of figure 4 that receives the $e(n)$ input)).

Referring to claims 6 and 17, Ho discloses a digital subscriber line (DSL) transmission system in which at least a first outgoing symbol and a second outgoing symbol are successively transmitted, and an echoed first outgoing symbol and an echoed second outgoing signal are successively received (a echo cancellation transmission system which continuously transmits and receives symbols (see figure 4)), a method comprising an act of A) compensating at least a first portion of the echoed second outgoing signal based on an estimation of a first portion of the echoed first outgoing symbol (a $\text{Ref}(f)$ signal, which is calculated based on the echo of a echoed first signal, is passed back to the echo canceller to adapt for future cancellations in the next received signal echoes (see figure 4 and column 6 lines 1-3 and 50-59)); and wherein the act of A) includes an act of essentially replacing the first portion of the echoed second outgoing signal with the estimation of the first portion of the echoed first outgoing symbol (the first outgoing

Art Unit: 2662

signal is used for canceling the echo of the next outgoing signal (see column 6 lines 50 through column 7 line 44)).

Ho does not disclose a circuit for making a local echo orthogonal. However, the APA discloses a prior art method wherein circuitry is used to make echo signals orthogonal (see page 3 lines 1-18). It would have been obvious to one skilled in the art at the time of the invention to implement this aspect of the APA into Ho because as the APA points out if echo signals are not orthogonal the discontinuities which have a wide spectrum will occur and affect all the nearby channels.

Referring to claims 11,12,14,15,22 and 23 Ho discloses the system discussed above.

Furthermore, Ho discloses that the act A) comprises acts of:

A1) obtaining a difference between a first portion of the first outgoing symbol and a first portion of the second outgoing symbol (the end of a previous block is subtracted from the end of the current block (see column 7 lines 15-24));

A2) applying an estimated transfer function of echo generation to the difference to generate an echo compensation signal (an echo cancellation signal is generated (see signal "e(n)" of figure 4)); and

A3) adding the echo compensation signal to at least the first portion of the echoed second outgoing symbol (the adder cancels the echo of the outgoing signal (see the adder in item 104 of figure 4));

wherein the act A1) includes an act of applying a one symbol delay to at least the first and second outgoing symbols (the delay block is delayed for one cycle (see column 7 lines 15-44));

Art Unit: 2662

wherein the act A2) includes an act of: calculating the estimated transfer function based at least on a plurality of outgoing symbols and a plurality of incoming symbols (the Ho system operates continuously thus plural symbols will provide the echo signal (see figure 4)).

wherein each outgoing symbol and each incoming symbol has a total symbol length (inherently, the symbols have a total length (see figure 4)), and wherein the act of calculating the estimated transfer function includes an act of: calculating the estimated transfer function based only on a portion of the total symbol length (the tail portion is used to calculate the echo signals (see column 7 lines 15-44)).

7. Claims 2,13 and 24-27, as best understood, rejected under 35 U.S.C. 103(a) as being unpatentable over Ho in view of APA and further in view of Kioke (USPN 5,084,865), hereafter referred to as Kioke.

Referring to claims 2,13 and 24, Ho discloses the system discussed above. Ho does not disclose that the filter is a finite impulse response (FIR) filter used to continuously calculate signal coefficients. However, Kioke discloses an echo cancellation system, which uses an FIR to calculating the coefficients of signals (see figure 1 and abstract). It would have been obvious to one skilled in the art at the time of the invention to implement FIR filters in Ho to perform coefficient calculation because FIR filters provide 'linear phase' characteristics that provide delay to the input signals without phase distortion and they also provide desirable numeric properties (i.e. since there is no feedback in FIR filters, coefficient calculations are more reliable). Therefore, using a FIR filter in Ho would make Ho more reliable and robust.

Art Unit: 2662

Referring to claims 25 and 26, Ho discloses the system discussed above. Furthermore, Ho discloses that the at least one controller further includes at least one calculating unit configured to calculate the estimated transfer function based at least on a plurality of outgoing symbols and a plurality of incoming symbols (the Ho system operates continuously thus plural symbols will provide the echo signal (see figure 4));

wherein each outgoing symbol and each incoming symbol has a total symbol length (inherently, the symbols have a total length (see figure 4)), and wherein the at least one calculating unit is configured to calculate the estimated transfer function based only on a portion of the total symbol length (the tail portion is used to calculate the echo signals (see column 7 lines 15-44)).

Referring to claims 27, Ho discloses the system discussed above. Ho does not disclose that the act of calculating the estimated transfer function includes an act of calculating the estimated transfer function based on approximately 5% of a total number of samples of each symbol. However, It would have been obvious to one skilled in the art at the time of the invention to calculate the echo in this manner because if only 5% of the samples are needed the system will be able to perform the estimation faster thus making the Ho system operate faster.

8. Claims 3,5,9,10,16,20 and 21, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho in view of the APA.

Referring to claim 3, Ho discloses the system discussed above. Ho does not disclose that the predetermined time interval is equal to a maximum delay between the incoming and outgoing symbols. However, It would have been obvious to one skilled in the art at the time of the

Art Unit: 2662

invention to implement the delay in Ho to this maximum since any shorter delay may cause the system to miss the incoming symbol, thus the signal will not be properly sample and result is errors.

Referring to claim 5, Ho discloses the system discussed above. Ho does not disclose that the FIFO memory has a size for storing only the beginning portion of each outgoing symbol, is write-enabled during said time interval from the beginning of each outgoing symbol, and read-enabled during said time interval from the end of each outgoing symbol. However, it would have been obvious to one skilled in the art at the time of the invention to implement this feature in Ho because such a feature would reduce the power requirements of the system since the circuit would not to be enabled for the entire length of the symbol, thus saving power in the HO system.

Referring to claims 9,10,20 and 21, Ho discloses the system discussed above. Ho does not disclose that the first portion of the echoed second outgoing signal and the first portion of the echoed first outgoing symbol have a same length that is less than or equal to a maximum delay between transmitted and received symbols and not exceeding 5% of the total length. However, it would have been obvious t one skilled in the art to limit the lengths of the symbol portions to these parameters because doing so would require less bandwidth and would ensure that the its within the maximum delay, thereby making Ho more bandwidth efficient and reliable.

Referring to claims 16, Ho discloses the system discussed above. Ho does not disclose that the act of calculating the estimated transfer function includes an act of calculating the estimated transfer function based on approximately 5% of a total number of samples of each symbol. However, It would have been obvious to one skilled in the art at the time of the

Art Unit: 2662

invention to calculate the echo in this manner because if only 5% of the samples are needed the system will be able to perform the estimation faster thus making the Ho system operate faster.

Response to Arguments

9. Applicant's arguments with respect to claims 1-6, 9-17 and 20-27 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Odland whose telephone number is (571) 272-3096. The examiner can normally be reached on Monday - Friday from 8am to 5pm.

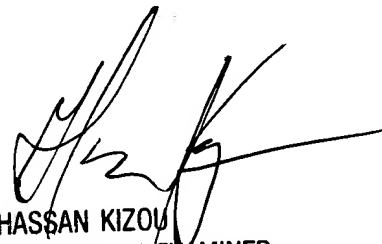
Art Unit: 2662

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou, can be reached at (571) 272-3088. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

deo

October 18, 2004



HASSAN KIZOU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600